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ophy must go further than this, and as Mr. Chauncey Wright says, it is not going any further to insist upon our accepting, to start with, an inscrutable postulate which may contain *in petto* anything that the adept chooses to evoke from it. Mr. Fiske, e. g. thinks that the progress of knowledge from age to age "is best described as a continuous process of *deanthropomorphization*"; i. e. a progressive stripping off of the old idea of Purpose, and replacing it by the conception of physical agencies. But physical agencies, however universal their operation may be, and because it is universal, cannot explain an individual fact. Nor does the addition of the word "Evolution," even if spelled with a capital, explain it. What is unwrapped must depend upon what was wrapped up, and to say, e. g. that the shape of a dog is the resultant of the mutual attraction and repulsion of the component molecules, is like accounting for the color of a cat by saying that in the dark all cats are gray. It is saying in substance that the shape is a matter of accident. This is what makes the sting of the suggestion that we are all descended from "some ape-like animal," — the thought, not that we were once apes, but that we are apes now, — with superficial differences.

The impression, then, that we have received from Mr. Fiske's book is, that the philosophy of Mr. Spencer will not long content an active inquiring mind like his, but that he will by and by come to much better results of his own.

8. — *Chemical and Geological Essays.* — By THOMAS STERRY HUNT, LL. D. Boston: James R. Osgood & Co. 1875.

THE records of modern science are nowadays generally hidden away from the public in the memoirs and proceedings of societies. Men of science write for their own class, save the happy few who can count upon the interest of their fellow-men in matters which directly affect the questions of their origin or well-being. Some of the greatest intellects of our generation are writing memoirs which will not be read by a hundred students of their time; and one of the best and greatest of American naturalists has just passed away from forty years of devoted labor, leaving hardly anything that can be called a book. Science has doubtless gained, though the public may have lost, by this specialization of labor. When he addresses the public, and lives by its favor, the student of nature must put bounds to his learning and his labor; but in the memoirs of his academy he may,

if he choose, write as Cayley or Boole have done, for half a dozen living men and a possible half-hundred of the next generation.

Dr. Hunt has shown a way of avoiding this difficulty, which gives once again a monastic exclusiveness to science, by gathering from the memoirs he has published at various times such as seemed to him worthy of a separate form. In half a thousand pages he has given us a collection of papers which mark the stages of growth in chemical geology during the quarter-century in which he has been a devoted worker in its fields. No one can read these memoirs without a conviction that much of the rapid progress this science has made within this time has been due to the very great talent and industry of their author.

In the first essay, "On the Theory of Igneous Rocks and Volcanoes," we have the suggestive basis of the first division of the book. It is substantially an essay towards the understanding of the means by which, from a primitive fused earth, we may have had the building up of the various siliceous, calcareous, and argillaceous rocks which occupy so large a part of its surface. From this paper we first get the distinct statement that a great number of felspathic rocks of the Laurentian system are interstratified with limestones and other rocks of an unquestionable aqueous origin. Here, too, we find the germs of his theory of "extravasated" rocks, which has done so much to explain the origin of a great variety of our trappean, granitic, and other materials, which were once supposed to be the remains of the original igneous mass of the earth. The next essay is discursive, but contains several suggestions of value with reference to the chemistry of the sea and of volcanoes. The third essay, on the "Chemistry of Metamorphic Rocks," is one of the most important in the volume; in it our author endeavors to find the basis for a chronology in the mineralogical constitution of the great underlying masses of crystalline rocks, founded upon their mineral constituents, and explained by their chemical history. With this means of differentiation, using the minerals of these early records as the paleontologist uses the fossils of the later rocks, he makes his well-known division of the non-fossiliferous crystalline rocks into the Laurentian, Norian, Green Mountain, and White Mountain series. These views come up again in the essay on the "Geognosy of the Appalachians," with the results of ten years' study added to them.

The essays "On the Chemistry of Natural Waters" give us, under a rather peculiar title, a remarkable series of suggestions and demonstrations concerning the history of the subterranean waters of our earth. Possibly the most valuable of the many important matters

touched on in this essay is that concerning the waters of the ancient oceans locked up in the masses of the rocks to which they gave birth. Along with this we have an admirable classification of the various mineral waters, and an effort to show their geological classification. However much subsequent investigation may modify our estimation of the chemical details of this scheme, there can be no doubt that Dr. Hunt has, in this series of essays on mineral waters, given us a solid basis for an understanding of this most important class of phenomena.

In the admirable essay on "The Origin of Metalliferous Deposits," we have a history of the relation of organic life to these deposits very clearly shown. The action of marine life in the concentration from sea-water of various metals, notably of silver and gold, was noticed some years before the publication of this essay (in 1869) by Professor Pumpelly, in a course of lectures at Harvard University. However, as no written publication of this opinion was made, Dr. Hunt is entitled to equal credit for the suggestion of this most important hypothesis.

The thirteenth essay, "On the Geognosy of the Appalachians," gives a most important summary of our knowledge of the rock series of that district. As it is in itself a remarkable piece of condensation, it is not possible to give a synoptical view of it. Every student of American geology should thoroughly possess himself of it; he will thereby acquire the best basis for a knowledge of the history of the chemical and physical questions he has to face in his work, and the best means of understanding them. The only thing it is possible to blame is the spirit in which the "eozoön question" is approached. This must remain, in the present state of our knowledge, a debatable matter, and the last word will be given by biologists rather than mineralogists. No doubt Dr. Hunt is right in the chemical reasons which led him to predict life on this level before the discovery of eozoön; but this does not materially advance the argument as to the organic nature of this questionable body.

The last essay our space will permit us to notice is that in the history of the names Cambrian and Silurian. Here we find no small amount of critical power given to the righting of the great wrong done Adam Sedgwick by his fellow-worker Roderick Impey Murchison. Sedgwick was a great calm nature, and detested broils; so he bore in patience the arrogant and baseless claims of Murchison. In the last of his many years he found in Dr. Hunt an able and zealous defender. We may look forward to the justification of Sedgwick in all future treatises on the Cambrian and Silurian rocks, and

this revision of judgment will have been greatly aided by this essay.

It would require almost a volume to notice the points worthy of attention contained in the twenty essays of this book. It would not be amiss to call it an encyclopædia of chemical geology. It is worth while to call the readers' attention to the essay on the origin of petroleum; remarks on the origin of coal. The geological student should especially attend to the whole of the matter concerning the origin of crystalline rocks, for every fact will be valuable to him. The final essays are directed to the establishment of a theory of chemical relations on a more assured and philosophical basis. Many of the views contained therein seem, after years of the forgetfulness which is so often fruitful of final approbation, to be now gaining acceptance among chemists.

The tone of the book is on the whole singularly uniform for work composed of fragments, done during twenty-five years of labor. Some readers may find it a little over-personal, and at times aggressive; but this is apt to be the case in the writings of a man thoroughly in love with his subject and fully convinced of his opinions. The polemical parts might have been spared without damage to the work; yet they are german to the matter and written in a fair spirit.

The mechanical parts of the work are pretty well done; there is an admirable Table of Contents, but the Index is hastily done and incomplete. There are names cited in important references in the book which do not appear in the Index. The old laws about indexes seem to have become dead letters, so we cannot pass sentence in this case.

On the whole, this volume is among the most creditable monuments of American science, and we may well hope the author may live to gather other rich harvests from the seed he has so well sown.

9. — *A Foregone Conclusion*. By W. D. HOWELLS. Boston: J. R. Osgood & Co. 1875.

THOSE who, a couple of years ago, read "A Chance Acquaintance" will find much interest in learning how the author has justified the liberal fame awarded that performance. Having tried other literary forms with remarkable success, Mr. Howells finally proved himself an accomplished story-teller, and the critic lurking in even the kindest reader will be glad to ascertain whether this consummation was due chiefly to chance or to skill. "A Chance Acquaintance" was indeed not only a very charming book, but a peculiarly happy hit; the fancy